Stewardship initiative: Current status and road ahead

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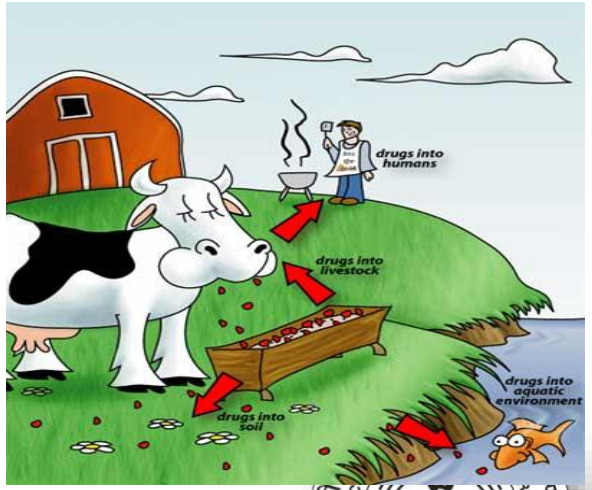
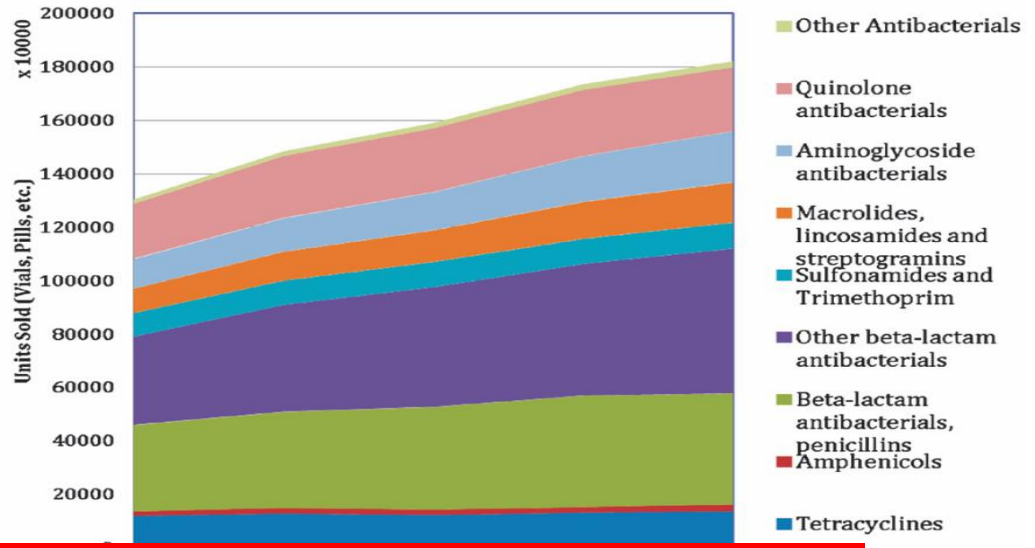
Infectious Diseases in India

- Huge burden of infectious diseases
  - Malaria, TB, HIV/AIDS, vector borne diseases, Influenza, other outbreaks
  - Diarrhea, pneumonia
  - Hospital acquired infections
- Sanitation conditions, poor infection control practices, malnutrition
- Close animal human interface



Antibiotic overuse

- $12.4 billion pharmaceutical industry
- Regulations over sale of antibiotics
- Unregulated use of antibiotics: H1 schedule is poorly implemented
- Use of antibiotics in livestock, poultry and agriculture



Evolution of antibiotic resistance is a consequence of selective pressure

Socio-economic factors

- Self-medication, previous doctors' prescriptions and leftover medicines from previous illnesses
- Access to antibiotics without prescription, use of pharmacies and informal healthcare providers as sources of healthcare
- Patients c
- Requestin
- Diagnosti s physicians linical failure
- Incentives offered by pharmaceutical companies to doctors and pharmacists to prescribe new antibiotics

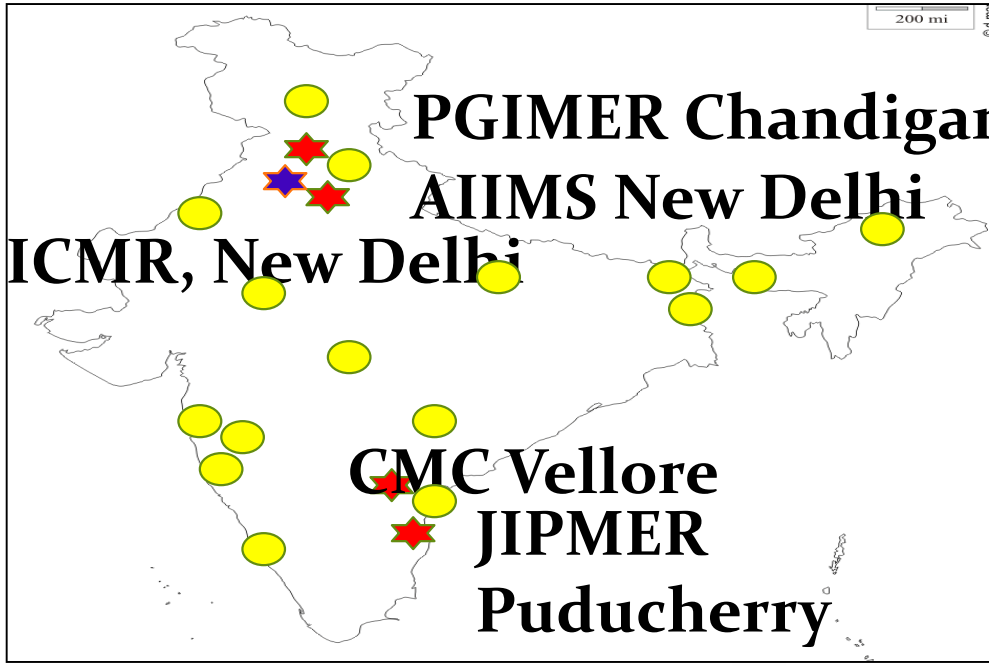
Regulatory Stewardship
Antimicrobial stewardship
Diagnostic Stewardship

Tackling Antimicrobial Resistance On Ten Fronts

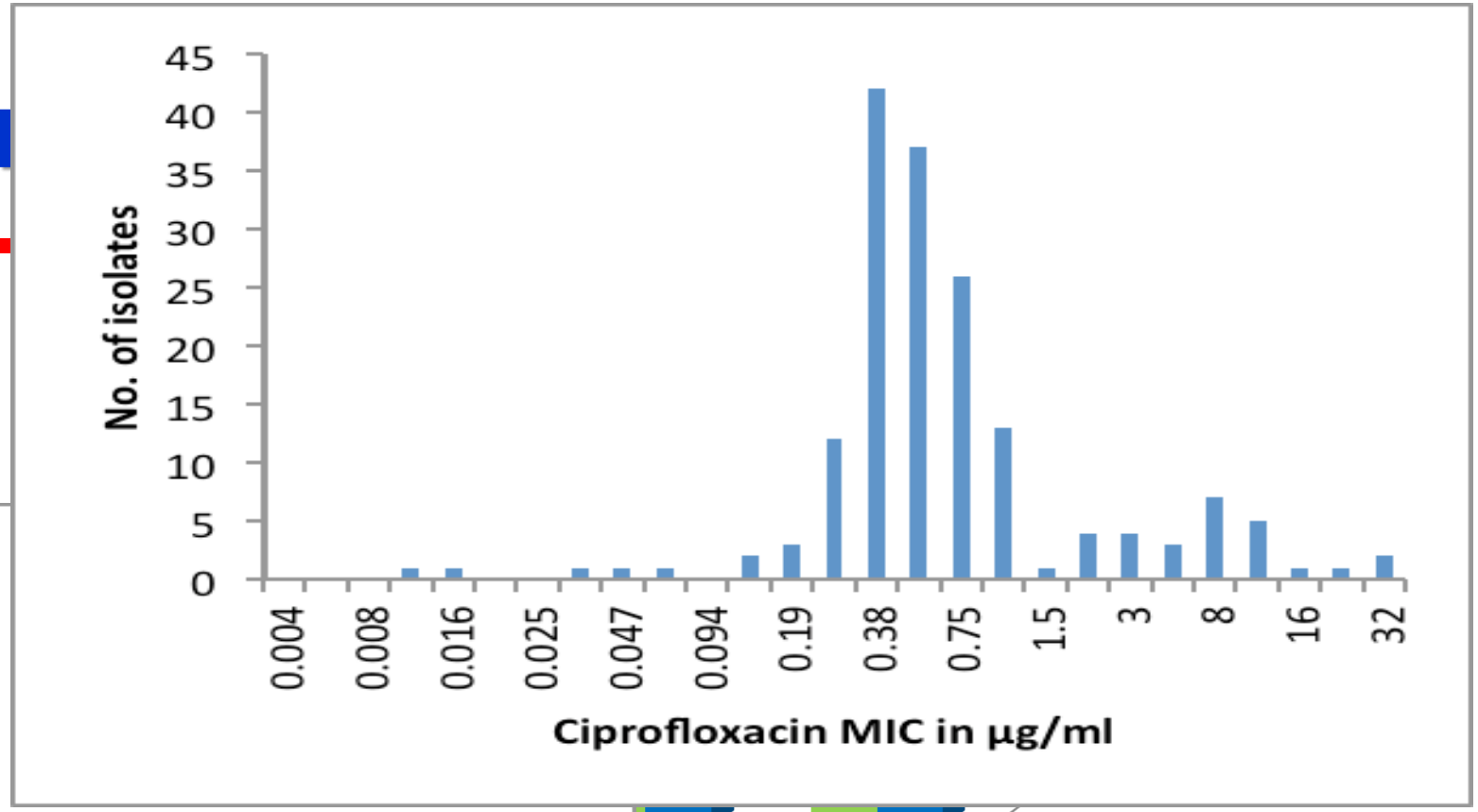
Indian Council of Medical Research

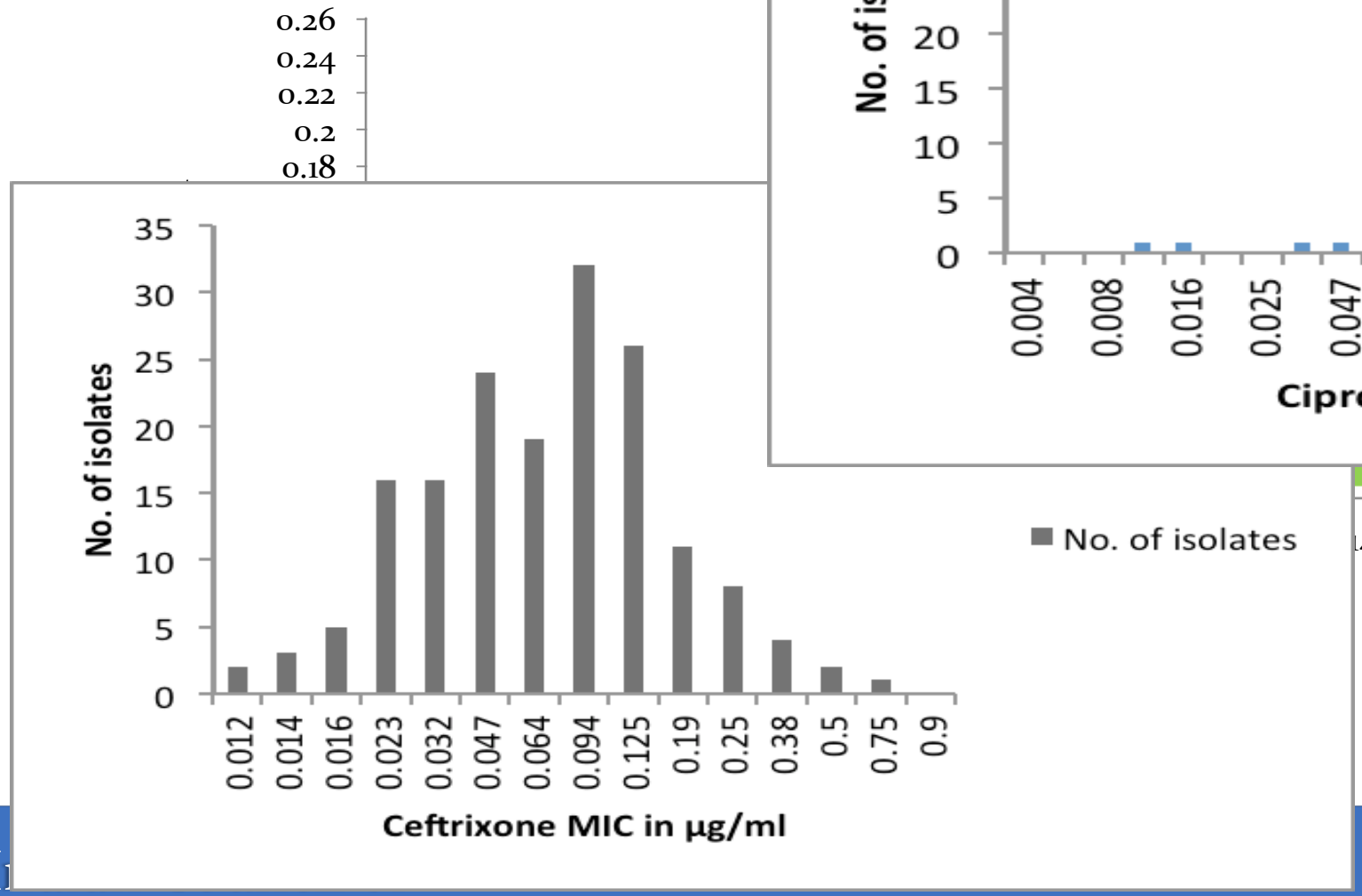
Antimicrobial Research and Surveillance Network at ICMR

- **Nodal centres are focal points for six pathogenic groups:**
  - ***Enterobacteriaceae* / sepsis**
  - **Gram negative non-fermenters**
  - **Enteric fever organisms**
  - **Diarrhoeagenic organisms**
  - **MRSA, Enterococcus**
  - **Fungal pathogens**
- 20 regional centers
- Tertiary care hospitals: Government and private corporate hospitals
- Diversity in capacities



Creeping I


No. of isolates
45
40
35
30
25
20
15
10
5
0
0.004
0.008
0.016
0.025
0.047
0.094
0.19
0.38
0.75
1.5
3
8
16
32
Ciprofloxacin MIC in µg/ml


0.26
0.24
0.22
0.2
0.18
No. of isolates
35
30
25
20
15
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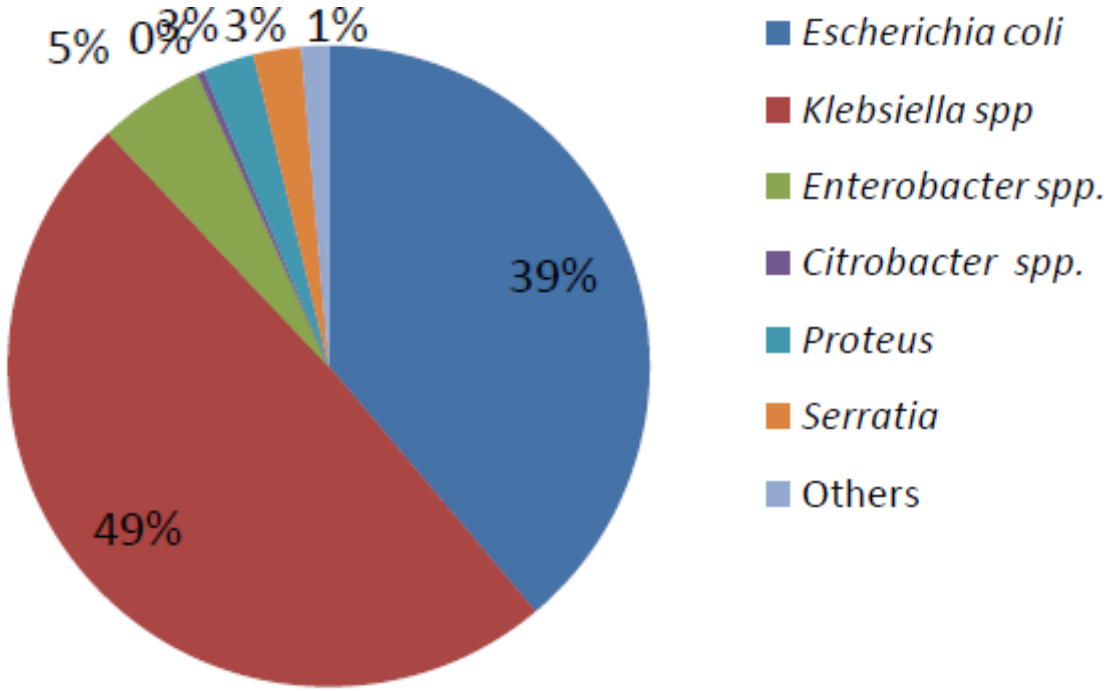
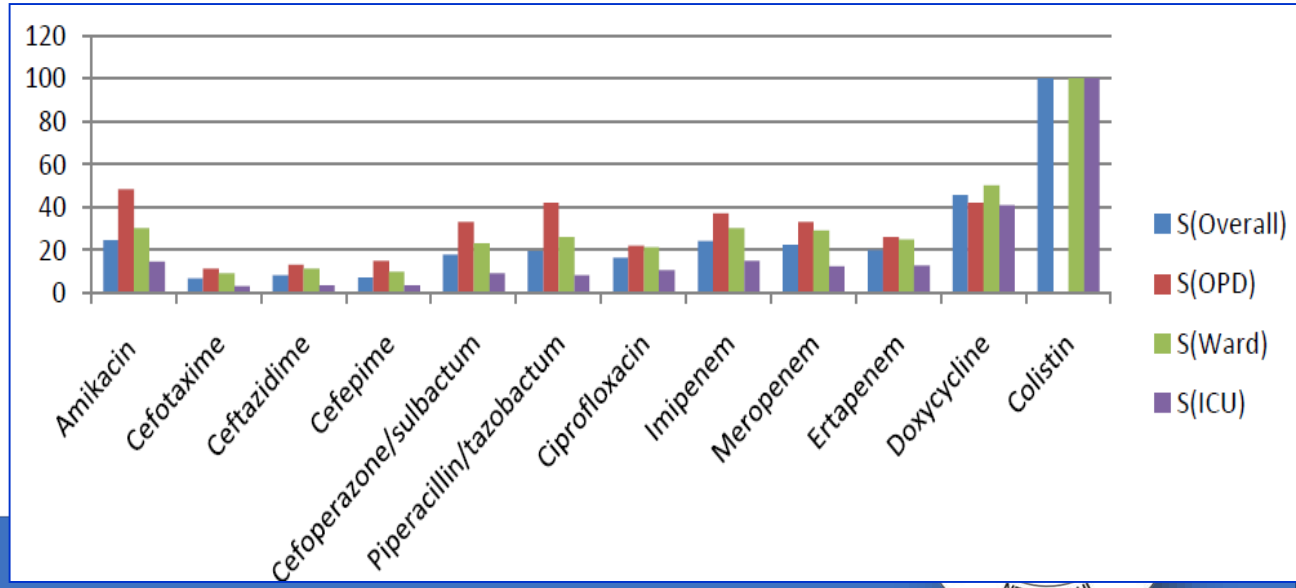
0
0.012
0.014
0.016
0.023
0.032
0.047
0.064
0.094
0.125
0.19
0.25
0.38
0.5
0.75
0.9
Ceftrixone MIC in µg/ml
No. of isolates
14
2015

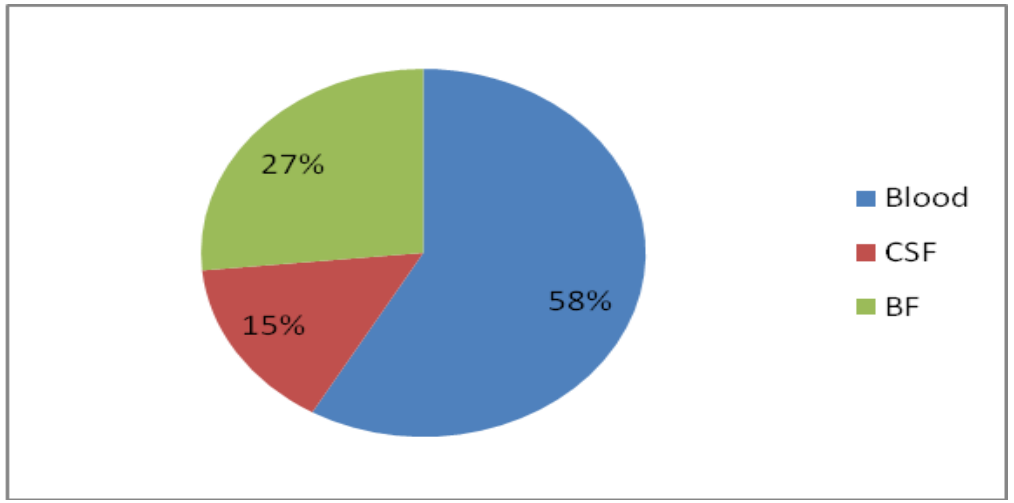
Enterobacteriaceae

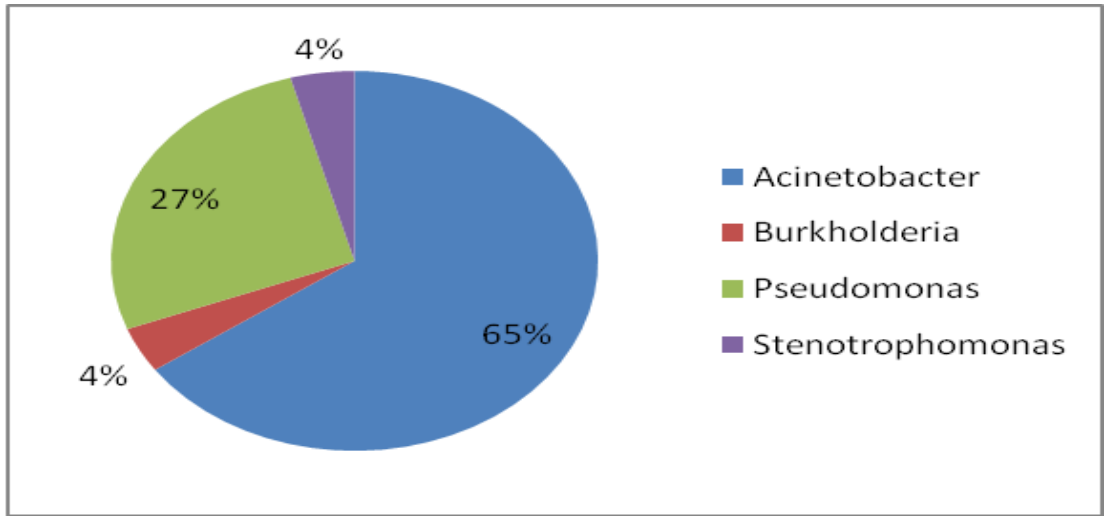
- ***Klebsiella pneumoniae*** **(49 %) was the most common isolate, followed by *Escherichia coli* (32%) and *Enterobacte* species(10%).**
- ***Escherichia coli***
  - **susceptible to colistin, chloramphenicol, amikacin, imipenem, meropenem, ertapenen**
  - **intermediately susceptible to piperacillin-tazobactam and cefoperazone-sulbactam.**
- ***Klebsiella* spp were far more resistant**
  - **susceptibility to colistin, chloramphenicol, doxycycline , amikacin, imipenem**
  - **intermediate susceptibility to, meropenem, amikacin, ciprofloxacin and ertapenem.**





Non-fermenting gram negative bacilli (NFGNB)





Over 3 years (2014-2016), there has been no significant change in the susceptibility profile of *P. aeruginosa*

Susceptibility for all antibiotics are >70%, where susceptibility to colistin is ~100% and appears promising

A baumanii: Decrease in susceptibility to Cefepime, Aztreonam, Netilmycin, Cefperazone/Sulbactam and Tetracycline were observed (~5%)

Carbapenem susceptibility is decreasing 5 – 10% every year

Gram positives

- MRSA has steadily decreased over the last 3 years from 37% in 2014 to 34% in 2015 and 28% in 2016 , 23.5% in 2017
- VRE rates have also shown a declining trend from around 7% in 2015 to about 4% in 2016.
- CoNS emerging as major nosocomial pathogen: *S haemolyticus and S epirdermidis*
- Significant creep in MIC values of VAN, LIN and TIG
- High prevalence of hVISA as revealed by the population analysis profile, highest rates seen in ICU isolates and in 2017, suggesting a cumulative effect of overuse of vancomycin the hospital setting
- Vancomycin resistance as expected was 3 times higher in *E.faecium* when compared to *E.faecalis*
- Overall glycopeptide resistance in Enterococci from <15% to near 30% over the same period.

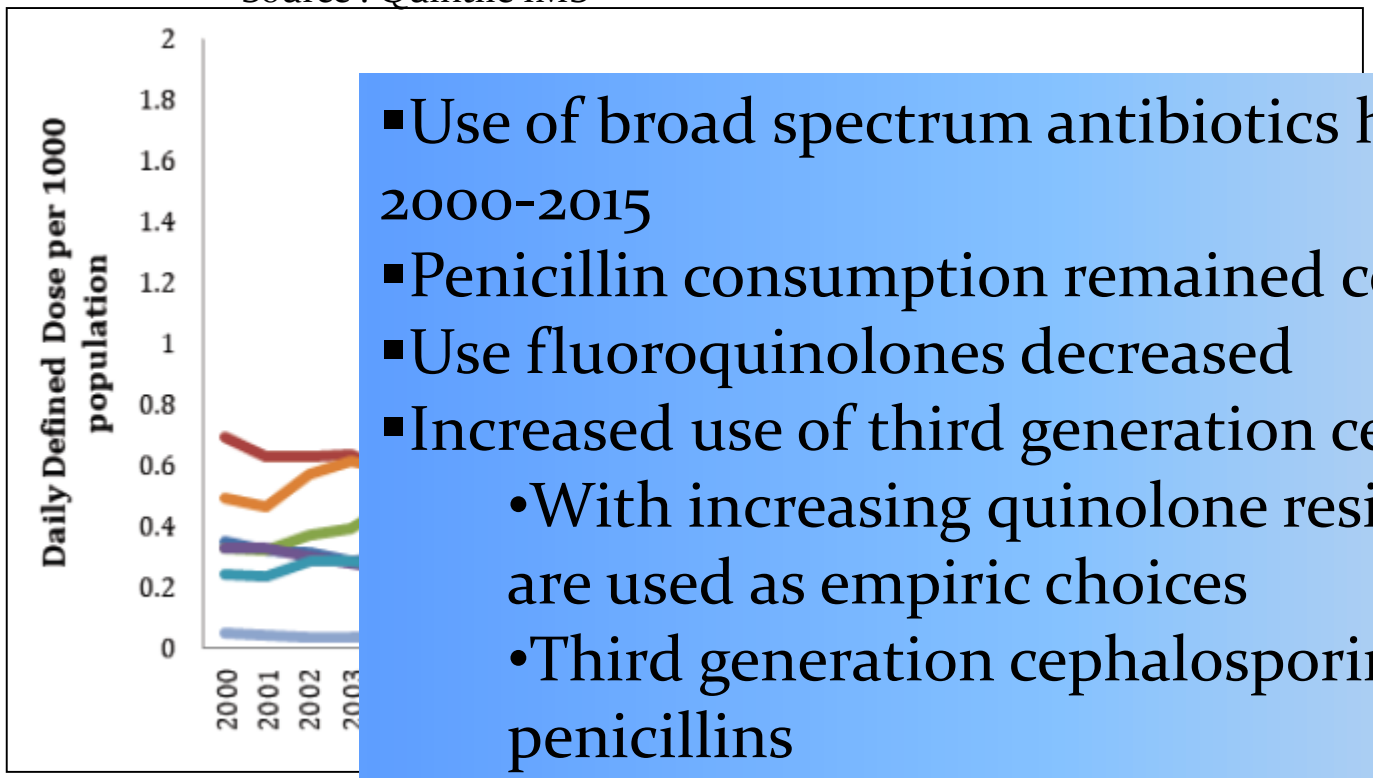
Antifungal resistance

- Fluconazole resistance was highest *C. tropicalis and also in C. albicans*
- *C. tropicalis* against fluconazole (5%), and caspofungin(5.7%)
- Voriconazole resistance was noted in 13.2% of *C. albicans.*
- *C. glabrata* exhibited 11.8% resistance to micafungin, 8.8% to caspofungin followed by 6.1% to posaconazole.
- *C. krusei* had 5.6% resistance to anidulafungin
- Outbreaks of Aspergillus and C. auris in hospitals

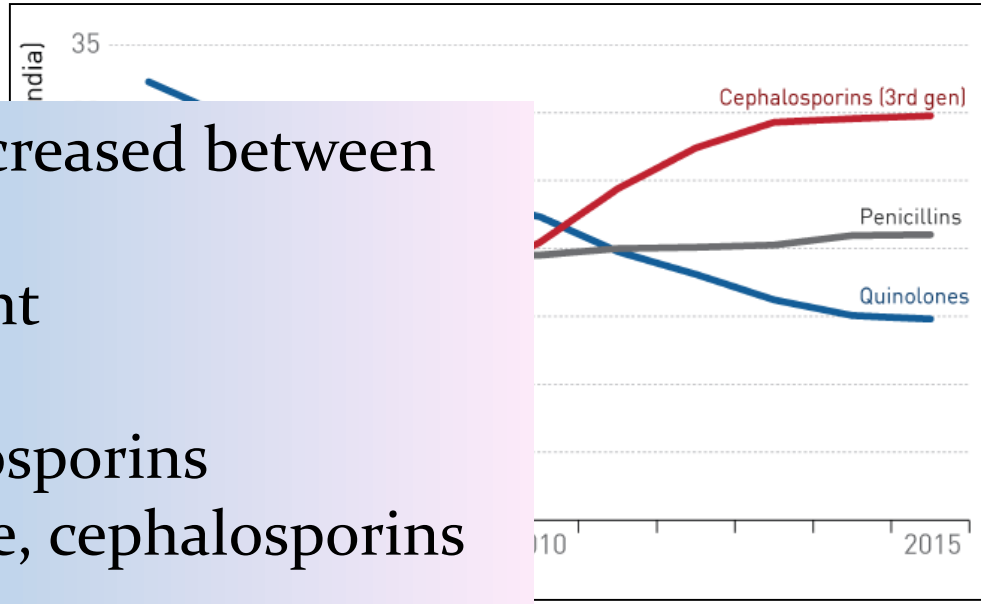
Antibiotic pressure is major driver of resistance

Trends in antibiotic consumption in India , 2000-2015

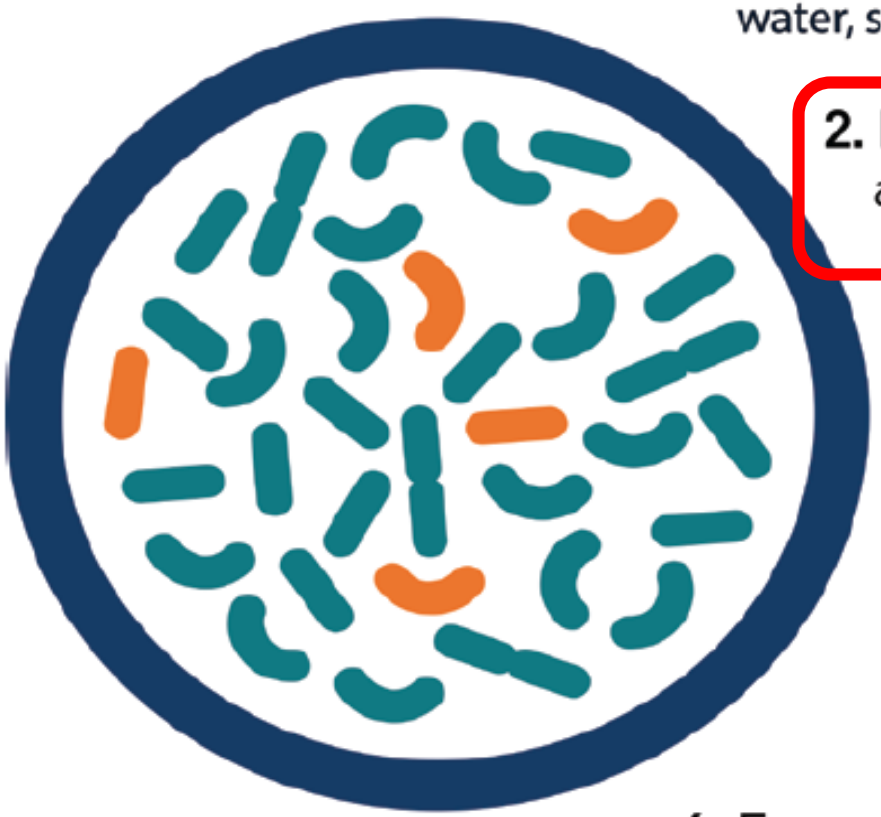
Source : Quintile IMS



- Use of broad spectrum antibiotics has increased between 2000-2015
- Penicillin consumption remained constant
- Use fluoroquinolones decreased
- Increased use of third generation cephalosporins
  - With increasing quinolone resistance, cephalosporins are used as empiric choices
  - Third generation cephalosporins being substituted for penicillins
  - Lack of widespread availability of narrow spectrum agents like first generation penicillins



Six strategies for combating AMR needed in national antibiotic policies



1. **Reduce** the need for antibiotics through improved water, sanitation, and immunization

2. **Improve** hospital infection control and antibiotic stewardship

3. **Change** incentives that encourage antibiotic overuse and misuse to incentives that encourage antibiotic stewardship

4. **Reduce** and eventually phase out subtherapeutic antibiotic use in agriculture

5. **Educate** health professionals, policy makers, and the public on sustainable antibiotic use

6. **Ensure** political commitment to meet the threat of antibiotic resistance

WHAT IS ANTIBIOTIC STEWARDSHIP?

"Coordinated interventions designed to improve and measure the appropriate use of antimicrobial agents by promoting the selection of the optimal antimicrobial drug regimen including dosing, duration of therapy, and route of administration"

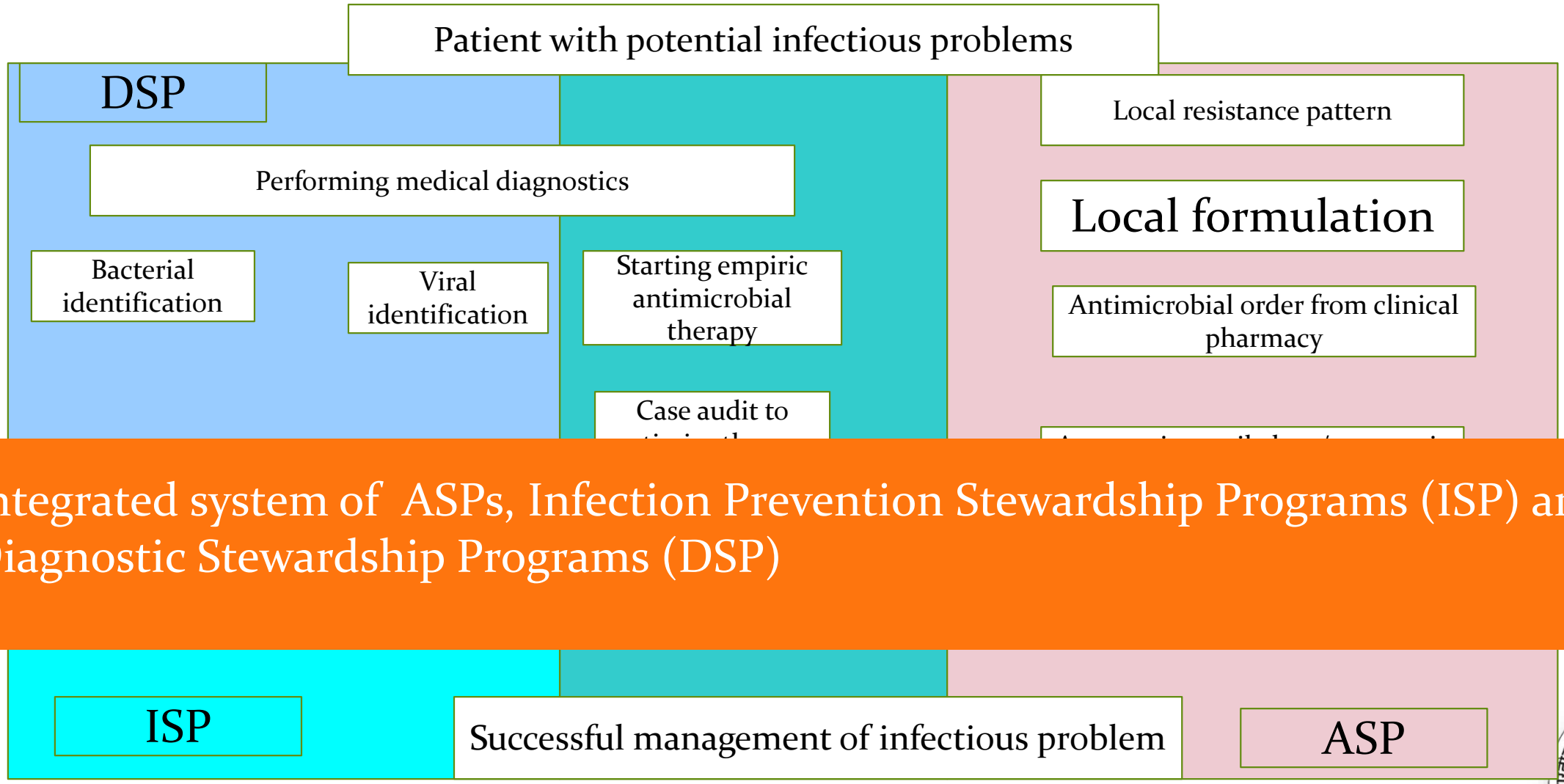
The Society for Healthcare Epidemiology of America (SHEA), The Infectious Diseases Society of America (IDSA) and the Pediatric Infectious Diseases Society (PIDS)

Key objectives of Antimicrobial stewardship

- Prescribers follow local evidence based antibiotic policies

- ❑ Ensure patient receives optimal treatment
- ❑ Protect effectiveness of broad spectrum antibiotics by restricting their use
- ❑ Reduce inappropriate use of antibiotics for self limiting infections such as coughs and colds
- ❑ Ensure health care professionals, patients and public understand the need to use antibiotics prudently

‘AID stewardship model’



Integrated system of ASPs, Infection Prevention Stewardship Programs (ISP) and Diagnostic Stewardship Programs (DSP)

Future Microbiol. (2015) 11(1), 93–102

Improved Diagnostics Stewardship

- Diagnostics must be appropriate for the individual patient, target all pathogens causing acute infections and detect colonization and/or infection.
- Helping individual physicians in selecting and interpreting diagnostic tests on the appropriate clinical specimens
- Diagnostic uncertainty, difficult for clinicians to know when to provide and when to withhold antibiotic treatment
- Time critical results will facilitate early management of life threatening infections
- Opportunity for including novel comprehensive diagnostic tools(molecular, multiplex, point of care) will provide results much faster personalized therapy, do not replace blood cultures

Infection Prevention Stewardship Program

- Right infection control measures in order to provide a safe environment for patients and healthcare workers
- Infection management is responsibility of all stakeholders
- Without the proper infection prevention measures, other interventions such as ASPs and DSPs will not yield the optimal effect
- Optimal therapy for individual patients but also for infection control and prevention purposes
- Early detection and close surveillance of MDROs, as well as an adequate rapid reaction to every possible transmission
- Organising units of infection control and prevention and medical microbiology within one single department provides opportunity for maximal collaboration
- Work closely with the internal medicine department and the hospital pharmacy

AMSP workshops

- Four workshops: Delhi, Mumbai, Kolkata, Chennai
- Led by ID physicians
- 30 medical colleges/hospitals both Govt and Private
- More than 150 staff trained

AMSP workshops organised by ICMR

ICMR-AIIMS-CDC Collaboration under GHSA

- Objectives of the collaboration:
  - Strengthen healthcare facility IPC programs based on gaps identified through standardized assessments
  - Implement standardized surveillance of HAIs caused by AMR pathogens
  - Enhance laboratory surveillance of priority AMR pathogens using externally quality-assured data
  - Improve capacity to respond to outbreaks of AMR infections related to healthcare delivery

Next steps

- Improve infection control
- Improve diagnosis
- Strengthen the AMSP: ICMR project being implemented